Computational Approaches for Developing Active Radiation Dosimeters for Space Applications Based on New Paradigms for Risk Assessment

Completed Technology Project (2013 - 2016)

Project Introduction

Exposure to ionizing radiation can cause acute injury or sickness in humans under circumstances of very large doses and it presents the possibility of causing cancer in humans at low doses. The composition and intensity of radiations in space are significantly different from the types of radiation encountered near the surface of the earth. NASA has supported an extensive research initiative to understand the physical characteristic of radiations in space as well as biological effects that could challenge the performance of astronauts during the missions and the risks of late occurring effects after the mission. That research has enabled NASA to propose new models for assessing the radiological risk to astronauts. These new paradigms of risk assessment place demands on radiation monitoring procedures that are not satisfied by existing space dosimetry systems. This proposal aims to take the first steps in identifying instrumentation and data acquisition systems that can permit NASA to meet its objectives and responsibilities for radiation protection of astronauts in the future. The research team has unprecedented capabilities in computational methodologies, particle accelerator experiments, detector development and flight instrument operations. The proposed research is a cost effective method to screen ideas and technologies at the very early stages, TRL-1, before making recommendations for design, fabrication and testing of dosimeter prototypes at the TRL-2 level.

Anticipated Benefits

NASA has supported an extensive research initiative to understand the physical characteristic of radiations in space as well as biological effects that could challenge the performance of astronauts during the missions and the risks of late occurring effects after the mission. That research has enabled NASA to propose new models for assessing the radiological risk to astronauts. These new paradigms of risk assessment place demands on radiation monitoring procedures that are not satisfied by existing space dosimetry systems. This project aims to take the first steps in identifying instrumentation and data acquisition systems that can permit NASA to meet its objectives and responsibilities for radiation protection of astronauts in the future.

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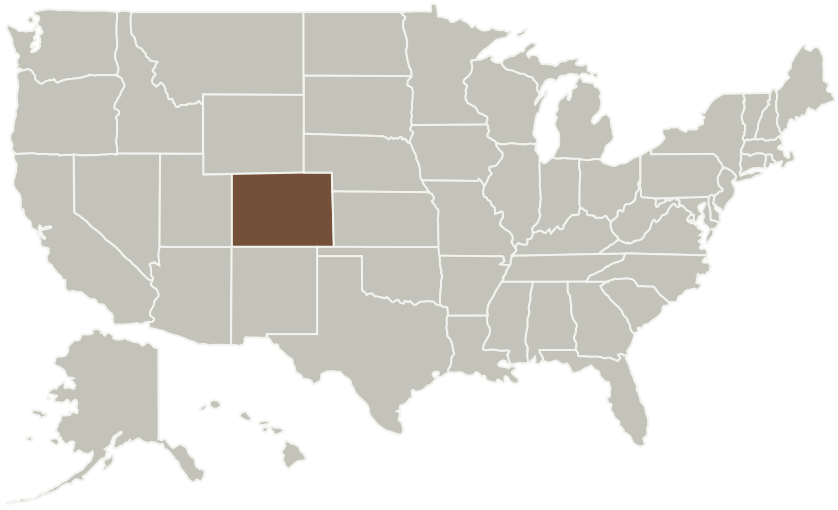
Table of Contents

Computational Approaches for Developing Active Radiation Dosimeters for Space Applications Based on New Paradigms for Risk Assessment

Completed Technology Project (2013 - 2016)

Primary U.S. Work Locations and Key Partners



Primary U.S. Work Locations
Colorado

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

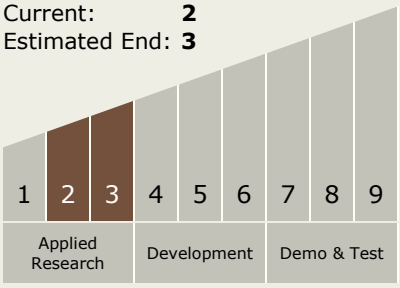
Hung D Nguyen

Principal Investigator:

Thomas B Borak

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



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Images

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Project Image Computational Approaches for Developing Active Radiation Dosimeters for Space Applications Based on New Paradigms for Risk Assessment
(https://techport.nasa.gov/image/1695)

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.5 Monitoring Technology